

**FIFTH FIVE-YEAR REVIEW REPORT FOR  
UNITED CHROME PRODUCTS, INC. SUPERFUND SITE  
BENTON COUNTY, OREGON**



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**Prepared by**

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*4/26/17*

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## LIST OF ABBREVIATIONS & ACRONYMS

ADI	Acceptable Daily Intake
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
DEQ	Oregon Department of Environmental Quality
EES	Easement and Equitable Servitudes
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
FYR	Five-Year Review
HI	Hazard Index
IC	Institutional Control
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operations and Maintenance
OU	Operable Unit
PFAS	Polyfluoroalkyl Substances
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act
UCP	United Chrome Products
UU/UE	Unlimited Use/Unrestricted Exposure

## **I. INTRODUCTION**

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fifth FYR for the United Chrome Products, Inc. (UCP) Superfund site (the Site). The triggering action for this policy review is completion date of the previous FYR. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of two operable units (OUs), which are addressed by this FYR. The OU1 remedy addresses contaminated groundwater, surface water, and sediments, and the OU2 remedy addresses contaminated soil.

EPA remedial project manager (RPM) Eva DeMaria led the FYR process. Participants included Norman Read from the Oregon Department of Environmental Quality (DEQ), Lisa Scherf from the City of Corvallis Public Works, Joey Hickey from the City contractor Geosyntec, and Johnny Zimmerman-Ward, Emily Chi, and Kelly MacDonald from EPA contractor Skeo. The review began on 3/21/2016.

### **Site Background**

The 1.5-acre area is a former industrial hard-chrome plating facility located at 2000 Airport Road in the city of Corvallis in Benton County, Oregon (Appendix A). Current site features include concrete slab building foundations, several old sheds, and concrete pads that were formerly occupied by tanks. The rest of the Site is graveled or vegetated. The Site is located in the Airport Industrial Park complex and is bounded by the Corvallis Municipal Airport. Located about 3.5 miles south of Corvallis, the Site is near the southern limits of the city's urban growth boundary. According to the 2010 Census, about 54,462 people live in Corvallis. There are only 32 people living within a mile of the Site.

In 1956, UCP began electroplating operations. The company created a dry well to dispose of floor drippings, washings, and product rinsate. Waste was reportedly neutralized with sodium hydroxide and/or soda ash prior to disposal. Use of the dry well purportedly ended in 1975. An estimated 1,000 gallons of waste were disposed of each year; the exact wastes discharged to the dry well are unknown. Waste likely came from spent plating bath solutions, spent stripping and cleaning bath solutions, or sludges from the bottom of plating baths.

The UCP Site was listed on the National Priorities List (NPL) on September 21, 1984. In January 1985, DEQ issued a Notice of Assessment of Civil Penalties to UCP for continued violations and for failing to institute operational improvements. The company appealed this order but ceased operating in early 1985. While UCP did not declare bankruptcy, the company had no funds available for remediation. The City of Corvallis owns the UCP site property and EPA later identified them as a potentially responsible party (PRP). EPA completed an emergency removal action to stabilize the Site by removing spent plating solution, drums, and containers in 1985. EPA completed a Remedial Investigation and Feasibility Study and issued a Record of Decision for soil and groundwater cleanup in 1986 and initiated remedial action for groundwater in 1987. PRP-lead soil cleanups were conducted in 2001 and 2011. Two Explanations of Significant Difference have been issued for this site, in 1991 to document changes to improve remedy performance and in 2010 to require Institutional Controls.

CoEnergy leases the northeast corner of the Site for truck parking and propane distribution. The City of Corvallis plans to construct a solar array on the western portion of the Site. Permits have been submitted and construction is expected to begin in the next several months. The City owns the Site and adjacent property, which is primarily open fields and the airport. During the June 2016 FYR site inspection, the Site was in use as a truck staging area for airport road improvements. The nearest residential area is located about 4,400 feet to the northeast, along State Highway 99W; these homes obtain drinking water from private wells. Besides the addition of the solar array, it is not expected that land uses on site will change. Site groundwater flows to the northeast and consists of an unconfined upper zone and a confined lower zone; the unconfined upper zone is classified as Class IIIA (not a potential drinking water source). The confined lower zone is classified as Class IIB (a potential drinking water source). Groundwater contamination is not known to have impacted residential wells.

### **FIVE-YEAR REVIEW SUMMARY FORM**

<b>SITE IDENTIFICATION</b>		
<b>Site Name:</b> United Chrome Products, Inc.		
<b>EPA ID:</b> ORD009043001		
<b>Region:</b> 10	<b>State:</b> OR	<b>City/County:</b> Corvallis, Benton
<b>SITE STATUS</b>		
<b>NPL Status:</b> Final		
<b>Multiple OUs?</b> Yes	<b>Has the site achieved construction completion?</b> Yes	
<b>REVIEW STATUS</b>		
<b>Lead agency:</b> EPA		
<b>Author name:</b> Eva DeMaria, with additional support provided by contractor Skeo		
<b>Author affiliation:</b> EPA Region 10		
<b>Review period:</b> 3/21/2016 - 4/26/2017		
<b>Date of site inspection:</b> 6/23/2016		
<b>Type of review:</b> Policy		
<b>Review number:</b> 5		
<b>Triggering action date:</b> 9/29/2011		
<b>Due date</b> ( <i>five years after triggering action date</i> ): 9/29/2016		

## II. RESPONSE ACTION SUMMARY

### Basis for Taking Action

The 1985 remedial investigation (RI) found that site operations resulted in groundwater, surface water, soil and surface sediment contamination (Table 1). EPA conducted a feasibility study (FS) in 1985 that identified several potential exposure routes: consumption of contaminated groundwater and surface water as well as ingestion of contaminated soil. Populations with the greatest exposure risk were confined lower zone well users, children playing in surface ditches (sediments), industrial workers, and potential residents.

**Table 1: Contaminants of Concern (COCs), by Media**

COC	Media
Chromium	Groundwater, surface water, sediment and soil

The FS Report stated that if the site was not cleaned up, workers and casual visitors would be exposed to contaminated soil. Chromium concentrations at the site were high enough to contribute substantially toward exceeding an acceptable daily intake (ADI) via ingestion of soil. Exposure to contaminated soil under the UCP building's concrete floor was not analyzed because no exposure pathway existed. However, if the concrete floor is ever demolished, potential exposure from this source area would have to be evaluated. The concrete slab acts as a cap to contaminated soils on site.

The FS Report stated that if groundwater was not remediated, chromium contamination levels in active city wells near the Site could approach the primary drinking water standard. As of the 1985 FS, two municipal confined lower zone wells were located about 3,000 feet and 4,700 feet downgradient (northeast) of the Site, respectively; the wells are no longer there. The FS also found that construction of a well in the confined lower zone would lead to ingestion of chromium in excess of the ADI.

### Response Actions

In July 1985, EPA initiated a removal action immediately after the company vacated the UCP building. EPA installed a perimeter fence and removed about 6,300 gallons of spent plating solution and 114 drums and containers. The removal action, completed in October 1985, addressed the majority of site source material, except for residual sludges in the bottom of the plating tanks. However, leaching from the dry well and plating tanks left considerable chromium contamination in the soil beneath and around the UCP building and in the upper and lower groundwater zones.

EPA selected the Site's long-term remedy in the Site's 1986 Record of Decision (ROD). For a complete list of documents reviewed for this FYR, see Appendix B. The ROD included three public health and environmental objectives:

- Adequately protect the public against contact with and ingestion of contaminated groundwater.
- Minimize threats from and adequately protect the environment against the spread of contaminated groundwater.
- Adequately protect the public against contact with and ingestion of contaminated soil and sediments.

Remedial components included:

- Installation of about 15 shallow wells (15 to 20 feet) to extract chromium-contaminated groundwater in the upper unconfined groundwater zone.

- Installation of about five deep wells (35 to 40 feet) to extract chromium-contaminated groundwater in the lower confined production aquifer (confined lower zone).
- Installation of on-site treatment equipment (chemical reduction and precipitation) to remove chromium contamination from extracted groundwater prior to discharge to Muddy Creek or the City of Corvallis' wastewater treatment facility.
- Construction of two percolation basins in the areas of the former dry well and plating tanks to flush contaminated soil above the shallow groundwater table. About 350 tons of contaminated soil excavated during the construction of these basins would be disposed of at a permitted land disposal facility.
- Installation of culverts in the adjacent open drainage ditch to isolate the surface drainage system from the inflow of contaminated surface water and groundwater from the Site.

EPA issued an Explanation of Significant Differences (ESD) in 1991 to document seven significant changes to the 1986 remedy. During the remedy's construction phase, EPA implemented five changes to improve remedy performance: (1) EPA demolished the UCP building; (2) rerouted the surface drainage ditch; (3) installed an infiltration trench; (4) installed injection wells; and (5) increased the number of wells. The other two significant changes included in the ESD were: (6) the use of the City of Corvallis' publicly owned treatment works to treat partially treated groundwater from the Site; and (7) changing the chromium cleanup goal for the confined lower zone to be consistent with EPA's maximum contaminant level (MCL) and maximum contaminant level goal (MCLG) revision. In December 1991, EPA designated the Site construction complete.

In 2002, EPA conducted a screening human health risk assessment for chromium in soils and a qualitative assessment of heavy metals in ditch sediment. The risk assessment for chromium indicated that on-site surface soil conditions presented unacceptable risks for industrial/commercial and residential use, with inhalation of airborne particulates and incidental soil ingestion as primary exposure routes. The qualitative assessment of past heavy metals data (from the 1985 FS) indicated that most contaminants were below residential screening levels or were consistent with natural background levels for soil. Arsenic and iron were the only contaminants that exceeded residential screening levels at the time. The FS attributed arsenic levels to high background concentrations. The FS determined iron levels were above the residential screening level but below the industrial level.

EPA signed a second ESD in 2010, requiring institutional controls at the Site, which were not explicitly outlined in the 1986 ROD or 1991 ESD. A 1993 deed restriction was already in place that limited groundwater use, but it did not include all the necessary restrictions for the Site to ensure long-term protectiveness. The 2010 ESD clarified that as long as hazardous substance concentrations exceed levels that allow for UU/UE, the selected remedy needed to include institutional controls to:

- Establish a groundwater exclusion zone encompassing all groundwater contaminated with chromium above the MCL within which extraction or use of the groundwater for consumption or other use is prohibited, except for treatment, monitoring, or temporary dewatering related to response action.
- Prohibit residential use of areas where residual soils exceed acceptable risk levels for so long as contamination remains above levels that allow for UU/UE.
- Restrict industrial and commercial uses of the Site to prevent unacceptable exposure to residual contamination.

The ESD stated that the City of Corvallis must implement an Easement and Equitable Servitudes (EES) to put all necessary restrictions in place. The ESD noted that the City and/or any successor owners have primary responsibility for maintaining and ensuring that all lessees and tenants are aware of the restrictions and comply with them until EPA and DEQ agree to modify or remove the restrictions. The City of Corvallis filed the EES in 2011.



The 1986 ROD did not establish a soil cleanup goal but did set groundwater cleanup goals for total chromium (Table 2). The cleanup goal for the confined lower zone was more stringent than the goal for the unconfined upper zone, because EPA considers the confined lower zone a drinking water source in direct hydraulic connection to local drinking water supply wells. The cleanup goal for the unconfined upper zone was developed for the protection of the deep groundwater aquifer and represented the minimum cleanup required to protect the local drinking water supply. The upper groundwater zone is not a source of current or potential drinking water due to seasonal limited availability and low yield insufficient to meet the needs of an average family. The 1991 ESD updated the total chromium cleanup goal for the confined lower zone to 0.1 milligrams per liter (mg/L), which was consistent with EPA's revision to the National Primary Drinking Water Regulations for both the chromium MCL and the MCLG. The ROD required that the drinking water standard for the confined lower zone be achieved at the plant site boundary; however, this point of compliance is inconsistent with EPA's current groundwater protection strategy. According to EPA's *Guidance for Evaluating Completion of Groundwater Restoration Remedial Actions* (OSWER 9355.0-129, November 2013), groundwater remediation levels generally should be attained throughout the contaminant plume.

**Table 2: Groundwater COC Cleanup Goals**

Groundwater COC	Cleanup Goal (mg/L)
Total chromium (confined lower zone)	0.1
Total chromium (unconfined upper zone)	10
<i>Sources:</i> 1986 ROD and 1991 ESD	

### **Status of Implementation**

EPA performed the following remedy design and construction activities from December 1987 to September 1991:

- Decontamination, demolition and off-site disposal of the vacant UCP building. EPA left the building foundation to act as a barrier to prevent direct contact with contaminated soils.
- Excavation and off-site disposal of about 800 tons of highly contaminated soil from the former dry well and plating tank areas.
- Installation of piezometers, monitoring wells, and extraction wells as well as associated conveyance piping and well controls to pump contaminated groundwater from the unconfined upper zone to the on-site pretreatment system.
- Construction of extracted groundwater influent and effluent holding tanks, installation of a skid-mounted chemical reduction and precipitation pretreatment system, and setup of an office/laboratory trailer for use by operations and maintenance (O&M) staff.
- Installation of confined lower zone extraction wells and associated conveyance piping and well controls.
- Construction of a bypass ditch to reroute surface water drainage around the perimeter of the Site and removal of remaining highly-contaminated ditch sediments.

After EPA conducted these activities, the City of Corvallis assumed responsibility for the remedial action pursuant to the Site's 1989 Administrative Order and the 1992 Consent Decree. Currently, the Site is in the O&M phase. The remainder of the remedy's implementation is summarized below.

### *Groundwater Extraction and Treatment*

The unconfined upper zone groundwater extraction system began operating in 1988. Monthly extraction rates began steadily declining in May 1991 and individual wells were shut off after reaching the ROD cleanup goal. The unconfined upper zone extraction and treatment system stopped operating in December 2004. All unconfined

upper zone groundwater extraction wells, conveyance piping, and other infrastructure were removed, and unconfined upper zone groundwater sampling no longer occurs.

The final confined lower zone groundwater system included 17 wells – two injection wells, seven extraction wells, and eight monitoring wells. The extraction system began operating in August 1991. There were several brief intermissions for soil excavation, pump replacement, and monitoring periods to evaluate rebound. The rebound is attributed to a natural vertical hydraulic gradient that transports contaminated groundwater from the unconfined upper zone to the confined lower zone. As individual wells met the cleanup goal, they were turned off. Currently, DW-8 is the only operating groundwater extraction well used to recover contaminated groundwater and provide hydraulic containment.

Initially, groundwater treatment occurred at a system on site. Due to reduced chromium concentrations, the treatment system was dismantled in 1999 and removed from the Site. DW-8 currently discharges groundwater to the publicly owned treatment works.

#### *Infiltration Systems and 2000 Soil Removal*

The City used two infiltration basins, an injection trench, and two confined lower zone injection wells to introduce potable water to the aquifers to accelerate remediation. Between August 1991 and February 1994, 5.5 million gallons of municipal water were injected into the confined lower zone through wells DW-9 and DW-10. Due to its ineffectiveness, the confined lower zone injection system was shut down in February 1994. Between August 1988 and September 2000, the City flushed 17.2 million gallons of potable water through upper zone soil using the infiltration basins and trench. From June 1998 to July 2000, a subsurface soil investigation took place to verify the infiltration basin's flushing effectiveness, and the City identified hot spots of soil contamination. EPA advised the City that further soil remediation would be necessary. By October 2000, the City excavated 1,956 tons of soil containing total chromium at concentrations greater than 6,000 milligrams per kilogram (mg/kg) and transported the material off site. The 1998 Upper Zone Groundwater Source Investigation Report established the 6,000 mg/kg excavation criteria to be protective of the 10 mg/L unconfined upper zone chromium cleanup level. The infiltration basins were decommissioned in September 2000 in conjunction with the upper zone soil excavation.

#### *2011 Soil Removal*

Although the ROD did not establish a soil excavation remedy or a cleanup goal for chromium based on direct contact, the City excavated 855.3 tons of chromium-contaminated soil from targeted areas of the Site in 2011. The objective was to remove sufficient material such that the concentration of total chromium remaining in soil in the EES-controlled area achieves DEQ's  $1 \times 10^{-6}$  acceptable risk level. The City's contractor developed total chromium soil action levels of 170 mg/kg, based on industrial exposure within the EES area, and 8.8 mg/kg, based on residential exposure outside the EES area. To ensure action levels were protective of exposure to hexavalent chromium, the City's contractor based the action levels on the EPA's industrial and residential regional screening levels (RSLs) for hexavalent chromium and the average site-specific ratio of hexavalent chromium to total chromium of 0.033 for 0 to 3 feet. Because the residential-based action level of 8.8 mg/kg is below the soil background level of 35 mg/kg, the final residential action level was the background level. This action also included confirmation sampling to determine if total chromium remaining in soil outside the EES boundary allowed for UU/UE. All soil was disposed of in an off-site landfill. Excavated areas were backfilled. The City removed enough contamination so the remaining total chromium concentration in the EES area was less than 170 mg/kg, the concentration deemed acceptable for industrial work exposure. For a complete list of site events, see Appendix C.

## **Institutional Control Review**

The City placed a deed restriction on the site property in 1993 (Table 3). The deed restriction limits groundwater use for pumping wells or any other activities that could jeopardize cleanup activities or create a threat to human health and the environment on site or on surrounding property owned by the City of Corvallis.

**Table 3: Summary of Planned and/or Implemented Institutional Controls (ICs)**

<b>Media, engineered controls, and areas that do not support UU/UE based on current conditions</b>	<b>ICs Needed</b>	<b>ICs Called for in the Decision Documents</b>	<b>Impacted Parcel(s)</b>	<b>IC Objective</b>	<b>Title of IC Instrument Implemented and Date</b>
Groundwater	Yes	Yes	See Figure 1.	Restriction of groundwater use for pumping wells or any other activities that could jeopardize the cleanup activities taking place on the property or create a threat to human health and the environment on site or on surrounding property owned by the City of Corvallis.	1993 Declaration of Deed Restriction
Groundwater	Yes	Yes	See Figure 1.	No consumptive or beneficial use of groundwater as long as contaminant concentrations exceed risk-based cleanup levels for beneficial use; maintenance of the existing groundwater pumping restriction for the Site and adjacent land as long as chromium concentrations in confined lower zone aquifer groundwater exceed the acceptable risk level for a drinking water beneficial use.	2011 EES
Soil	Yes	Yes	See Figure 1.	No disturbance of the natural ground surface except with prior written approval from DEQ; maintenance of existing soil, asphalt, and concrete surfaces within the property to prevent inadvertent exposure to areas of residual soil contamination; no residential or agricultural use of the property; no occupation of the property unless EES restrictions are met and a biennial report is submitted to DEQ; and DEQ notification before any transfer, conveyance, or occupancy of the property, of any changes to property use that might expose unacceptable risks, or of any property rezoning petitions.	2011 EES

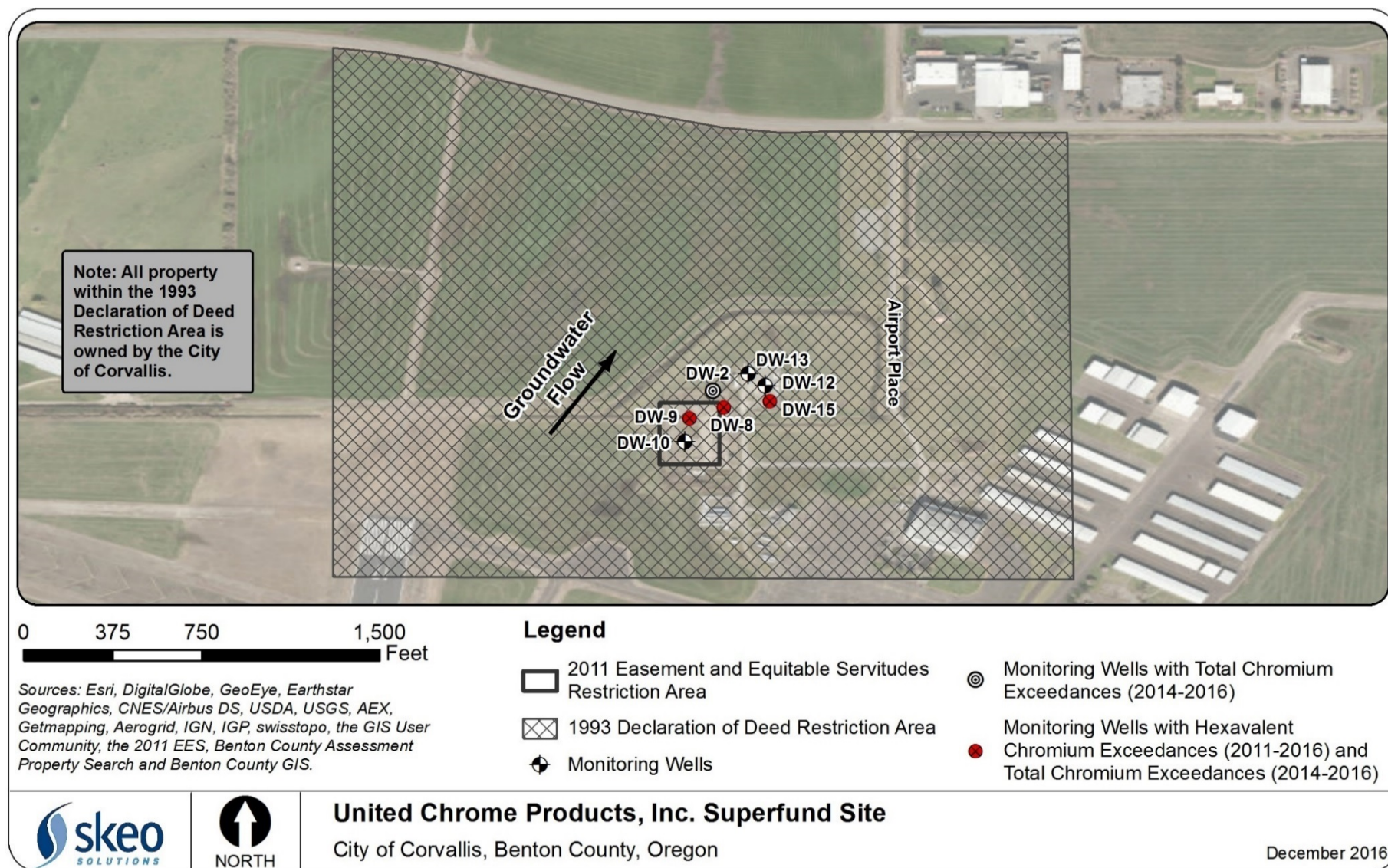
The 2010 ESD required implementation of institutional controls at the Site (Table 3). In addition to the existing deed restriction on groundwater use, the ESD stated that the City of Corvallis must file an EES to implement all necessary restrictions. In September 2011, the City filed an EES with the Benton County Clerk's Office. EES restrictions and requirements include:

- No consumptive or beneficial use of groundwater as long as contaminant concentrations exceed risk-based cleanup levels for beneficial use;
- Maintenance of the existing groundwater pumping restriction for the Site and adjacent land as long as chromium concentrations in confined lower zone groundwater exceed the acceptable risk level for a drinking water beneficial use;

- No disturbance of the natural ground surface except with prior written approval from DEQ;
- Maintenance of existing soil, asphalt, and concrete surfaces to prevent inadvertent exposure to areas of residual soil contamination;
- No residential or agricultural use of the property;
- No occupation of the property unless EES restrictions are met and a biennial report is submitted to DEQ;
- DEQ notification before any transfer, conveyance or occupancy of the property, of property use that might expose unacceptable risks, and of any property rezoning petitions.

The EES also provided site access to EPA and DEQ. The City of Corvallis owns all the property under institutional controls (Figure 1).

**Figure 1: Institutional Control Map**



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

## **Systems Operations/Operations & Maintenance**

There is currently no O&M Plan in place. Groundwater is sampled semiannually in the confined lower zone. The City operates extraction well DW-8 to extract and treat contaminated groundwater and provide hydraulic containment between the unconfined upper zone and the confined lower zone. The City also inspects DW-8 on a weekly basis.

### **III. PROGRESS SINCE THE LAST REVIEW**

This section includes the protectiveness determinations and statements from the last FYR as well as the recommendations from the last FYR and the current status of those recommendations (Tables 4 and 5).

**Table 4: Protectiveness Determinations/Statements from the 2011 FYR**

<b>OU #</b>	<b>Protectiveness Determination</b>	<b>Protectiveness Statement</b>
Sitewide	Short-term Protective	The remedy currently protects human health and the environment, however, in order to ensure that the remedy remains protective in the long-term, enforceable institutional controls need to be recorded, the groundwater remedy needs to be further evaluated and optimized, if necessary, and the groundwater point of compliance and soil remediation goals need to be clarified.

**Table 5: Status of Recommendations from the 2011 FYR**

<b>Issue Number</b>	<b>Issue</b>	<b>Recommendations</b>	<b>Current Status</b>	<b>Current Implementation Status Description</b>	<b>Completion Date (if applicable)</b>
1	Deep aquifer not achieving groundwater remediation goals due to flux from upper zone soils and groundwater	a. Continue groundwater extraction and treatment system to maintain hydraulic containment  b. Conduct groundwater remedy optimization study	Ongoing	Well DW-8 has been used to maintain hydraulic containment.  A groundwater remedy optimization study was not completed. On 12/7/2016, Region 10 submitted a request to EPA HQ for help in conducting the groundwater optimization study.	N/A
2	Existing ICs may not be protective in the long term	Finalize ICs in an EES	Completed	The EES was finalized.	9/28/2011
3	No soil remediation goal for direct human exposure	Specify soil remediation goal in decision document	Considered But Not Implemented	EPA has determined that the removal action was protective and no decision document is necessary.	N/A
4	Current groundwater point of compliance for the deep aquifer not consistent with EPA Groundwater Protection Strategy	Clarify point of compliance for deep aquifer groundwater in a decision document	Ongoing	EPA is considering whether clarification of the point of compliance for deep aquifer groundwater is necessary.	N/A

## **IV. FIVE-YEAR REVIEW PROCESS**

### **Community Notification, Involvement, and Site Interviews**

A public notice was posted in the *Corvallis Gazette-Times* newspaper on 6/16/2016. It stated that the Site's fifth FYR was starting and invited the public to submit any comments to EPA (Appendix D). The results of the review and the FYR Report will be made available at the Site's information repository, located at Corvallis-Benton County Public Library, 645 NW Monroe Avenue, Corvallis, Oregon 97330. During the FYR process, interviews were conducted with representatives from DEQ, the City of Corvallis, and Geosyntec (the City of Corvallis' contractor) to review the remedy and its current status. The results of these interviews are summarized below. Complete interviews are included in Appendix E.

Norman Read from DEQ indicated that the remedy addressed immediate risks from soil and groundwater and that groundwater risks could be addressed with institutional controls and O&M activities. He noted that, based on current data, it would require a very long time for the remedy to attain remedial goals. He stated that Oregon allows verifiable use restrictions and natural attenuation as valid remedies. Mr. Read believes that current institutional controls are protective of human health and the environment and that the proposed commercial surface use of the Site is in line with EES restrictions. He has not received any complaints from residents in the last five years. He did not have any recommendations regarding the management of the Site's remedy.

Lisa Scherf of the City of Corvallis stated that the Site has been stable and that the cleanup has achieved its objectives. She commented that transferring the Site to DEQ would make it eligible for closure and that this would be a positive outcome. Ms. Scherf also noted that there is a half-time O&M presence on site, but there is always someone available when no one is at the Site. She noted that the City is planning to install a ground-mounted solar array in the fall of 2016.

Joey Hickey of Geosyntec stated that the cleanup is complete, except for limited areas of point-of-compliance exceedances in the groundwater. He noted that the pump in DW-9 was replaced during the last five years. He said that natural attenuation and limited pumping will take significant time to clean up the confined lower zone to its cleanup goal and that transferring the Site to DEQ would allow for its closure under DEQ risk-based scenarios. Mr. Hickey commented that it does not seem necessary to consider a large-scale treatment system for a small groundwater plume that poses no risk to current or future receptors.

### **Data Review**

Over the last five years, the City of Corvallis' contractor has conducted groundwater sampling at several wells in the confined lower zone. The City no longer samples unconfined upper zone wells because they met the ROD cleanup goal, which was based on a transport model to protect the local drinking water supply rather than the chromium MCL. The unconfined upper zone extraction and treatment system stopped operating in December 2004.

Trends for wells with cleanup goal exceedances in the last five years are graphed below in Figures 2 and 3; well locations are shown in Figure 4. All monitoring data for the last five years for hexavalent and total chromium in the confined lower zone is located in Appendix F. In DW-8 and DW-9, it appears that chromium is primarily in the hexavalent form, based on review of the total chromium data in Appendix F. Hexavalent and total chromium in DW-8 and DW-9 have consistently exceeded the cleanup goal (Figures 2 and 3). The unconfined upper zone appears to be continually contaminating the confined lower zone. Results show a general increase in both wells, with a large spike for DW-8 in April 2014 that has since decreased. The August 2014 project update memo stated that the cause of the spike was unclear. It may be due to the nearly-one-month shutdown of the pumping well or a



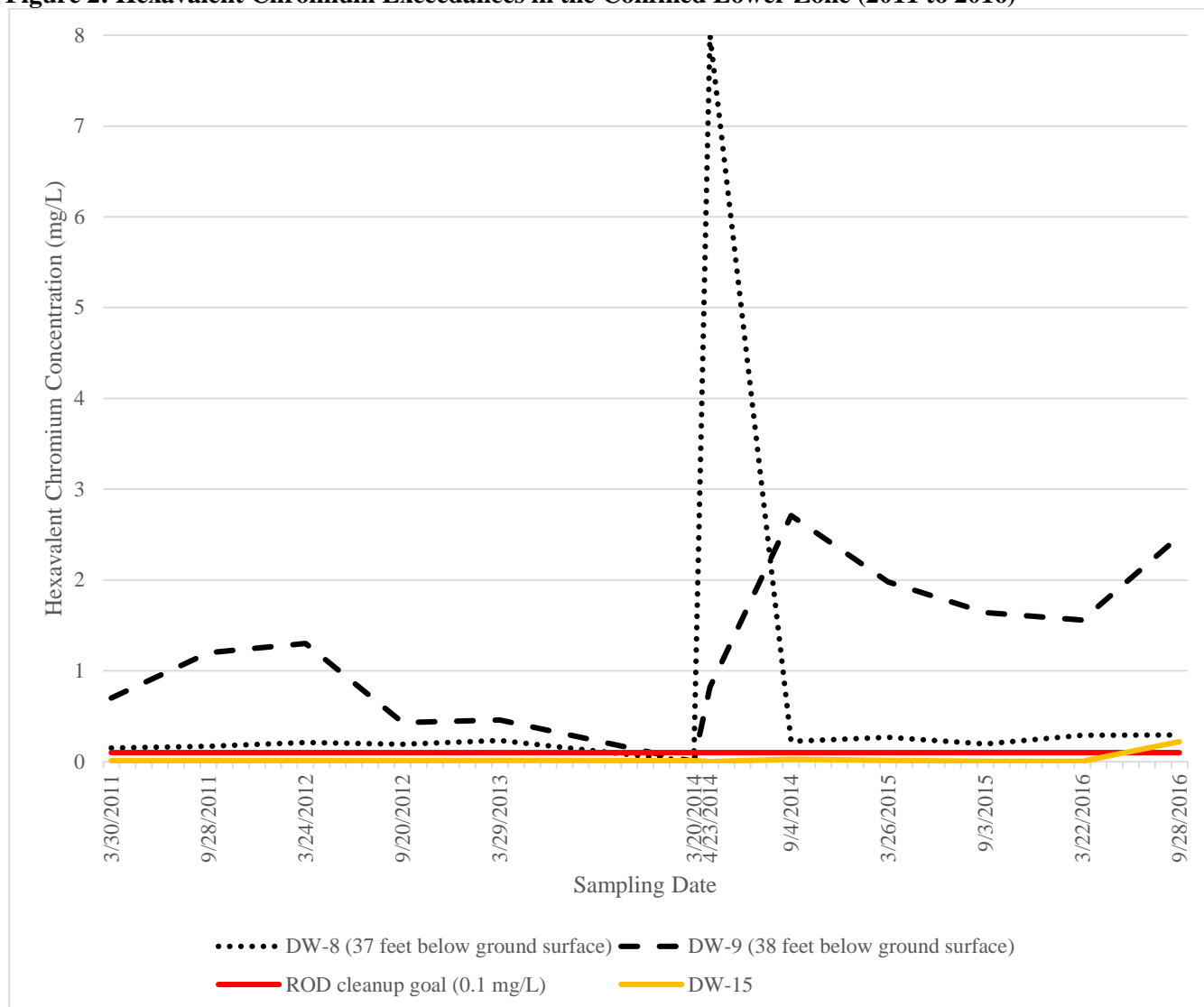
difference between the in-house laboratory method used by the previous consultant and the results from a fixed analytical laboratory.

The concentrations of hexavalent chromium detected in downgradient wells DW-15 and DW-2 are below the cleanup goal, with the exception of one large spike at DW-15 during the September 2016 sampling event. This was the highest concentration measured at DW-15 since 2004. It is unknown whether the elevated concentration is due to limited migration of the dissolved phase plume or an anomaly. Evaluation of total chromium concentrations from 2014 to 2016, show that downgradient well DW-15 has fluctuated above the MCL and downgradient well DW-2 has fluctuated around the MCL (Figure 3). Wells DW-12 and DW-13, located downgradient of DW-15 and DW-2, have not exceeded the MCL. There are no monitoring wells located downgradient of wells DW-12 and DW-13. As contamination migrates from the source area (DW-8 and DW-9), it appears that trivalent chromium becomes the dominant form of chromium in the groundwater (DW-2 and DW-15). Based on these results, it is important to continue monitoring total chromium concentrations to ensure all MCL exceedances are identified and to consider monitoring groundwater downgradient of DW-2 and DW-15 due to the fluctuations in concentrations above and around the MCL in these wells. In addition, the last FYR recommended clarifying the groundwater point of compliance, because the point of compliance identified in the ROD (the plant site boundary) was not consistent with EPA's current groundwater remedial strategy; the point of compliance clarification has not been addressed.

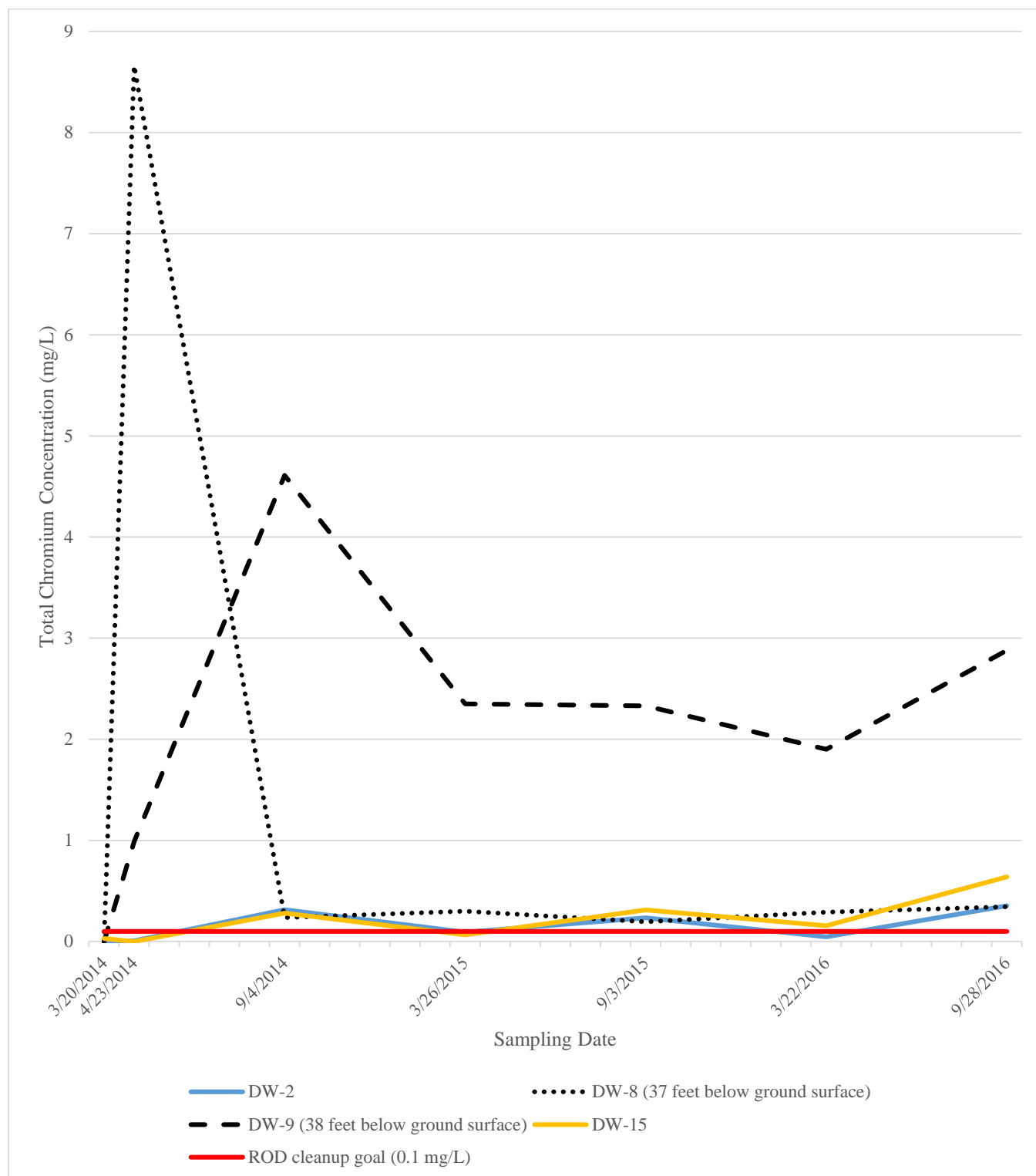
In 2016, oil was found in well DW-12. It appears to have been caused by a trailer stationed on the northeast portion of the Site that was reportedly dripping a black liquid.



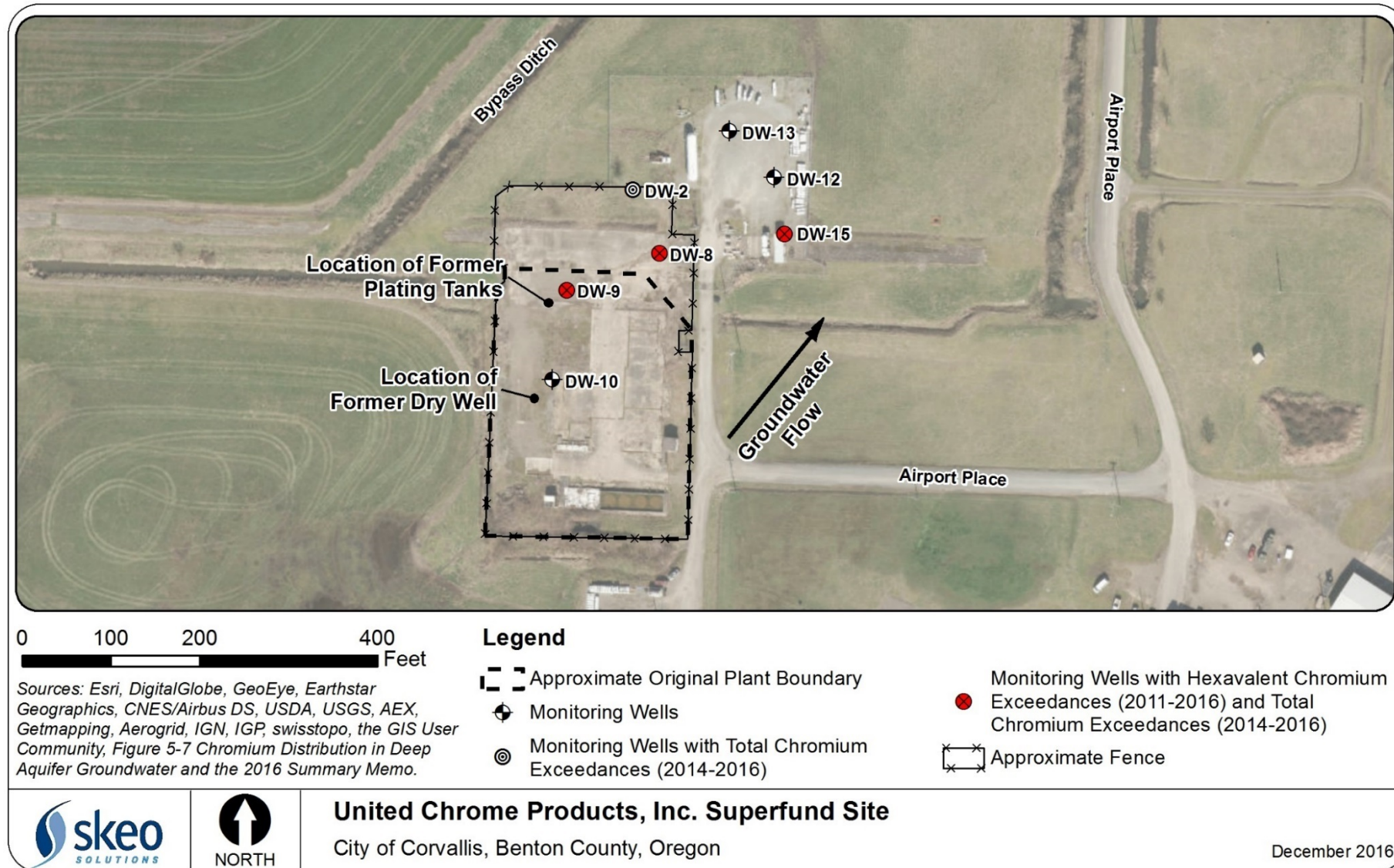
**Figure 2: Hexavalent Chromium Exceedances in the Confined Lower Zone (2011 to 2016)**



**Figure 3: Total Chromium Concentrations in the Confined Lower Zone (2014 to 2016)**



**Figure 4: Detailed Site Map**



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

## **Site Inspection**

The site inspection took place on 6/23/2016. In attendance were Eva DeMaria (EPA), Norman Read (DEQ), Joey Hickey (Geosyntec), Lisa Scherf, Greg Gescher and Robert Fenner (City of Corvallis Public Works), and Emily Chi and Johnny Zimmerman-Ward (Skeo). The purpose of the inspection was to assess the protectiveness of the remedy. Participants observed remedial components on site, including the former infiltration area as well as the former location of the groundwater pumping and treatment system. Concrete pads are all that remains of those remedial features. The Site is fenced; some of the fencing is overgrown with briars. Participants also observed the flush-mounted monitoring wells as well as the one recovery well, DW-8. This well continuously pumps groundwater to the municipal sewer.

During the inspection, the Site was in use as a truck staging area for a new road that, when completed, will provide access to the nearby airport. Participants also observed the portion of the site property leased to CoEnergy as a liquefied natural gas tank storage area. Site inspection participants observed DW-12, which had oil in it in 2016. Participants noted that an abandoned trailer nearby with oil possibly leaking from it could be the source of contamination. The completed site inspection checklist and photographs are available in Appendices G and H, respectively.

Skeo staff visited the site information repository, located at Corvallis-Benton County Public Library in Corvallis. Files as recent as the 2011 FYR Report were available to the public.

## **V. TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

### **Question A Summary:**

The remedy is functioning as intended by the decision documents.

There are no known groundwater users within ½ mile of the Site. The nearest residential drinking water wells are located approximately 4,400 feet northeast of the Site along State Highway 99W. The City has two inactive water supply wells in the area that had the pumps and wellhead piping removed. All drinking water for the Airport Industrial complex is delivered by underground pipeline from the City's Taylor Water Treatment Plant or the Rock Creek Water Treatment Plant. The remedy is currently achieving the public health and environmental objective of protecting the public from contact with and ingestion of contaminated groundwater. The deed restriction and EES prevent groundwater use. The extent of contaminated groundwater appears limited to the site area, despite exceedances in monitoring wells as described below.

Although the groundwater remedy has been implemented, and the Site is primarily in an O&M phase, hexavalent chromium concentrations in DW-8 and DW-9 consistently exceed the cleanup goal and both wells show a general increase in the last five years. Total chromium concentrations also exceeded the cleanup goal in DW-8, DW-9, DW-2, and DW-15. A large spike in the hexavalent chromium concentration in DW-15 was detected during the September 2016 sampling event, and it is unknown whether the elevated concentration is due to limited migration of the dissolved phase plume or an anomaly. The unconfined upper zone appears to be continually contaminating the confined lower zone; the current remedy of groundwater extraction and treatment at DW-8 to maintain hydraulic containment does not appear able to achieve drinking water standards in the near future. The last FYR Report recommended a groundwater remedy optimization study. This study is currently being implemented in order to further characterize and delineate the plume and determine a long-term groundwater remedial strategy to address remaining contamination. The City should also consider conducting a drinking water well survey to update current groundwater users.

The last FYR Report recommended clarifying the groundwater point of compliance. The ROD stated that the confined lower zone cleanup goal should be met at the plant site boundary. However, this point of compliance may be inconsistent with EPA's current groundwater protection strategy, which is to apply an MCL across an aquifer that is a current or potential drinking water source. EPA is considering whether it is necessary to clarify the point of compliance to ensure consistency with EPA's broader groundwater protection strategy.

There are currently no exposures to contaminated soils; the Site is fenced off and secure, although parts of the Site are in use. Several soil excavations have addressed source material. The former UCP building foundation is still in place and acts as a barrier to remaining soil contamination. The residual chromium concentrations in off-site soil (outside of the EES boundary) were identified as background. Chromium concentrations on site were identified as acceptable for industrial use, which is allowed by the EES. The EES restricts disturbance of the natural ground surface; requires maintenance of existing soil, asphalt and concrete surfaces; precludes residential and agricultural property use; and restricts property transfer and zoning.

There are no exposures to contaminated sediments or surface water. EPA removed highly-contaminated ditch sediments and constructed the bypass ditch to reroute surface water drainage around the Site in the late 1980s and early 1990s.

Lastly, there is currently no O&M Plan in place. To ensure long-term protectiveness, O&M procedures such as groundwater monitoring requirements and cap inspections should be clarified and included in a plan.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

**Question B Summary:**

As part of this FYR, a screening-level risk evaluation evaluated whether soil action levels for chromium remain valid. In 2000, the City excavated contaminated soils near the former plating tank and former dry well areas (shown in Appendix J) to the 6,000 mg/kg total chromium action level for the protection of groundwater. As shown in Table 6, this action level presents unacceptable carcinogenic risk for only the residential scenario, but this is acceptable because the EES prohibits residential use in this area.

During the 2011 soil removal, the City identified total chromium soil action levels for industrial and residential uses of 170 mg/kg and 35 mg/kg, respectively. These levels were also determined to be protective for exposures to hexavalent chromium since the action levels were adjusted to account for a site-specific ratio of hexavalent chromium to total chromium of 0.033, which was determined from 2011 soil sampling. The industrial action level of 170 mg/kg was calculated by using EPA's industrial RSLs for hexavalent chromium of 5.6 mg/kg and the site-specific ratio of hexavalent chromium to total chromium. This FYR's analysis indicates that the industrial and residential action levels of 170 mg/kg and 35 mg/kg are within EPA's acceptable risk range and below a target non-carcinogenic hazard index (HI) of 1.0 (Table 6).

Table 6: Screening-Level Risk Evaluation of Chromium Action Levels

Soil COC	Total Chromium Action Level (mg/kg)	Adjusted Action Level for Hexavalent Chromium <sup>a</sup>	RSLs (mg/kg) <sup>b</sup>		Screening-Level Risk Evaluation <sup>c</sup>	
			Risk-based (1 x 10 <sup>-6</sup> )	Non-carcinogenic HI=1	Carcinogenic Risk	Non-carcinogenic HI <sup>d</sup>
Residential Risk Evaluation						
Total chromium <sup>e</sup>	6,000 <sup>f</sup>	198	0.3	230 <sup>g</sup>	<b>7 x 10<sup>-4</sup></b>	0.9
Total chromium	35 <sup>h</sup>	1.16	0.3	230 <sup>g</sup>	4 x 10 <sup>-6</sup>	0.005
Composite Worker Risk Evaluation						
Total chromium	6,000 <sup>f</sup>	198	6.3	3,500	3 x 10 <sup>-5</sup>	0.06
Total chromium	170 <sup>i</sup>	5.61	6.3	3,500	9 x 10 <sup>-7</sup>	0.002
<p>Notes:</p> <p>a = The hexavalent chromium concentration is determined by multiplying the total chromium excavation action level by the 2011 Targeted Soil Removal Remedial Action Completion Report's site-specific hexavalent chromium to total chromium ratio of 0.033 for 0-3 feet.</p> <p>b = Chromium assumed to be in the more toxic hexavalent form. Values are EPA's regional screening levels (RSLs) for carcinogenic and non-carcinogenic effects, available at <a href="https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016">https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016</a> (accessed 06/16/16).</p> <p>c = Screening level risk evaluation: Risk = (hexavalent chromium cleanup criterion/RSL)(1 x 10<sup>-6</sup>) HI = (hexavalent chromium cleanup criterion/RSL)</p> <p>d = Non-carcinogenic HI is based on a child for residential exposure and an adult for composite worker exposure.</p> <p>e = Total chromium did not have RSL values. Instead, EPA used the values for hexavalent chromium. To ensure calculating the greatest potential risk, EPA's regulation assumes that a measurement of total chromium is 100 percent hexavalent chromium, the more toxic form.</p> <p>f = Chromium action level established by the 1998 Upper Zone Groundwater Source Investigation.</p> <p>g = Non-carcinogenic residential RSL is based on child risk.</p> <p>h = Chromium background level, determined to be acceptable for UU/UE in the 2011 soil removal action.</p> <p>i = Chromium action level used in the 2011 soil removal action.</p> <p><b>Bold</b> = exceedance of acceptable risk</p>						

In addition, the 2002 Screening Human Health Risk Assessment for Chromium in Soils and Qualitative Assessment of Heavy Metals in Ditch Sediment indicated that iron concentrations outside of the Site were below the industrial screening level but exceeded the residential screening level. The FS Report stated that this was acceptable because residential use was unlikely. The 2011 Soil Removal Action Report stated that soil outside of the EES boundary was UU/UE. Based on iron concentrations in the 2002 Screening Human Health Risk Assessment for Chromium in Soils and Qualitative Assessment of Heavy Metals in Ditch Sediment, this statement is not accurate.<sup>1</sup> Iron is not a COC for the site, and there is no indication that iron in the ditch sediments is associated with the site. DEQ should consider whether iron in off-site soils poses a human health risk and if so, whether additional institutional controls or other actions are needed in this area to ensure protection of the public from contact with and ingestion of contaminated soil and sediments. Appendix I includes a comparison of iron concentrations and former and current screening levels.

The 1986 ROD did not identify any applicable or relevant and appropriate requirements (ARARs). The 1991 ESD identified the total chromium cleanup goal for the confined lower zone as the MCL and MCLG established under

<sup>1</sup> Ditch Sediment and Soil Sample Analytical Results extracted from Table 1.16 of the 1985 FS Report.

the National Primary Drinking Water Regulations. The current MCL and MCLG are listed in Table 7; no change in enforceable standards has occurred. The cleanup goal for the unconfined upper zone represented the minimum cleanup required to protect the local drinking water supply; it was based on a transport model and not an ARAR.

**Table 7: ARAR Evaluation**

COC	Media	Cleanup Goal	Current Standard	Change
Total chromium	Groundwater (confined lower zone)	0.1 mg/L <sup>a</sup>	0.1 mg/L <sup>b</sup>	No change
Total chromium	Groundwater (unconfined upper zone)	10 mg/L <sup>c</sup>	NA <sup>c</sup>	NA
<i>Notes:</i> a = Cleanup goal from 1991 ESD. b = <a href="https://www.epa.gov/ground-water-and-drinking-water/table-regulated-drinking-water-contaminants">https://www.epa.gov/ground-water-and-drinking-water/table-regulated-drinking-water-contaminants</a> (accessed June 16, 2016). c = Cleanup goal from 1986 ROD was based on a transport model and not an ARAR.				

No new exposure pathways have been identified. While the land use at the Site may change to allow a solar array, this will not create any additional exposure issues. There have been no changes in ARARs or any standards relevant to the Site.

Perfluorylakyl substances (PFAS) have been identified as an emerging contaminant of concern for chrome-plating facilities. It is not known whether these products were used on Site. Information about past practices at the site should be reviewed to determine whether products containing PFAS were used at the Site. However, it is unlikely that PFAS were used as dust suppressants during the time period United Chrome operated.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

In 2016, sampling detected oil in well DW-12. The apparent cause of the contamination is a trailer stationed on the northeast portion of the Site that was dripping a black liquid. This black liquid should be characterized, the well should be cleaned and the source should be removed from the Site.

## VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations	
<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>	
OU 2	

Issues and Recommendations Identified in the FYR:
---

OU(s): OU1	<b>Issue Category:</b> Other
	<b>Issue:</b> PFAS have been identified as a contaminant of emerging concern for chrome-plating facilities. It is not known whether these products were used on site.
	<b>Recommendation:</b> Information about past practices should be reviewed to determine whether products containing PFAS may have been used at this Site and



	follow-up actions should be considered if available information indicates they were used at the Site.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	PRP	EPA	05/01/2018

<b>OU(s): OU1</b>	<b>Issue Category: Remedy Performance</b>			
	<b>Issue:</b> There is no O&M Plan in place.			
	<b>Recommendation:</b> An O&M Plan should be developed and implemented that requires continued monitoring of total and hexavalent chromium to ensure all MCL exceedances are captured and site inspections to ensure appropriate site use.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	PRP	EPA	5/1/2018

## OTHER FINDINGS

In addition, the following are recommendations that were identified during the FYR and may improve performance of the remedy, but do not affect current and/or future protectiveness:

- The current remedy of groundwater extraction and treatment at DW-8 to maintain hydraulic containment does not appear able to achieve drinking water standards in the near future. EPA is currently conducting a groundwater remedy optimization study in order to further characterize and delineate the plume and determine a long-term groundwater remedial strategy to address remaining contamination.
- The City should consider conducting a drinking water well survey to update current groundwater users.
- The current groundwater point of compliance may be inconsistent with EPA's groundwater remedial strategy. EPA should determine whether a change in the point of compliance is needed.
- Soil samples indicate elevated levels of iron concentrations outside of the Site were below the industrial screening level but exceeded the residential screening level. DEQ should consider whether iron poses a human health risk and if so whether additional institutional controls or other actions are needed in this area to ensure protection of the public from contact with and ingestion of contaminated soil and sediments.
- In 2016, sampling detected oil in well DW-12. The apparent cause of the contamination is a trailer stationed on the northeast portion of the Site that was dripping a black liquid. The City should ensure well DW-12 is clean and characterize and remove the oil contamination source.



## VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit: 1</i>	<i>Protectiveness Determination:</i> Short-term Protective
<p><i>Protectiveness Statement:</i> The OU1 remedy currently protects human health and the environment. The groundwater extraction and treatment system continues to pump contaminated groundwater to the City of Corvallis' wastewater treatment facility. The City also implemented a deed restriction and Easement and Equitable Servitudes (EES) to limit groundwater use and establish a groundwater exclusion zone. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness:</p> <ul style="list-style-type: none"><li>• Information about past practices should be reviewed to determine whether products containing PFAS may have been used at this Site and follow-up actions should be considered if available information indicates they were used at the Site.</li><li>• An O&amp;M Plan should be developed and implemented that requires continued monitoring of total and hexavalent chromium to ensure all MCL exceedances are captured and site inspections to ensure appropriate site use.</li></ul>	

Protectiveness Statement(s)	
<i>Operable Unit: 2</i>	<i>Protectiveness Determination:</i> Protective
<p><i>Protectiveness Statement:</i> The remedy at OU2 is protective of human health and the environment. Soils have been cleaned up to levels protective of industrial use and appropriate institutional controls are in place to prohibit non-industrial use.</p>	

Sitewide Protectiveness Statement	
<i>Protectiveness Determination:</i> Short-term Protective	
<p><i>Protectiveness Statement:</i> The remedy currently protects human health and the environment. Soils have been cleaned up to levels protective of industrial use and appropriate institutional controls are in place to prohibit non-industrial use. The groundwater extraction and treatment system continues to pump contaminated groundwater to the City of Corvallis' wastewater treatment facility. The City also implemented a deed restriction and Easement and Equitable Servitudes (EES) to limit groundwater use and establish a groundwater exclusion zone. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness:</p> <ul style="list-style-type: none"><li>• Information about past practices should be reviewed to determine whether products containing PFAS may have been used at this Site and follow-up actions should be considered if available information indicates they were used at the Site.</li></ul>	

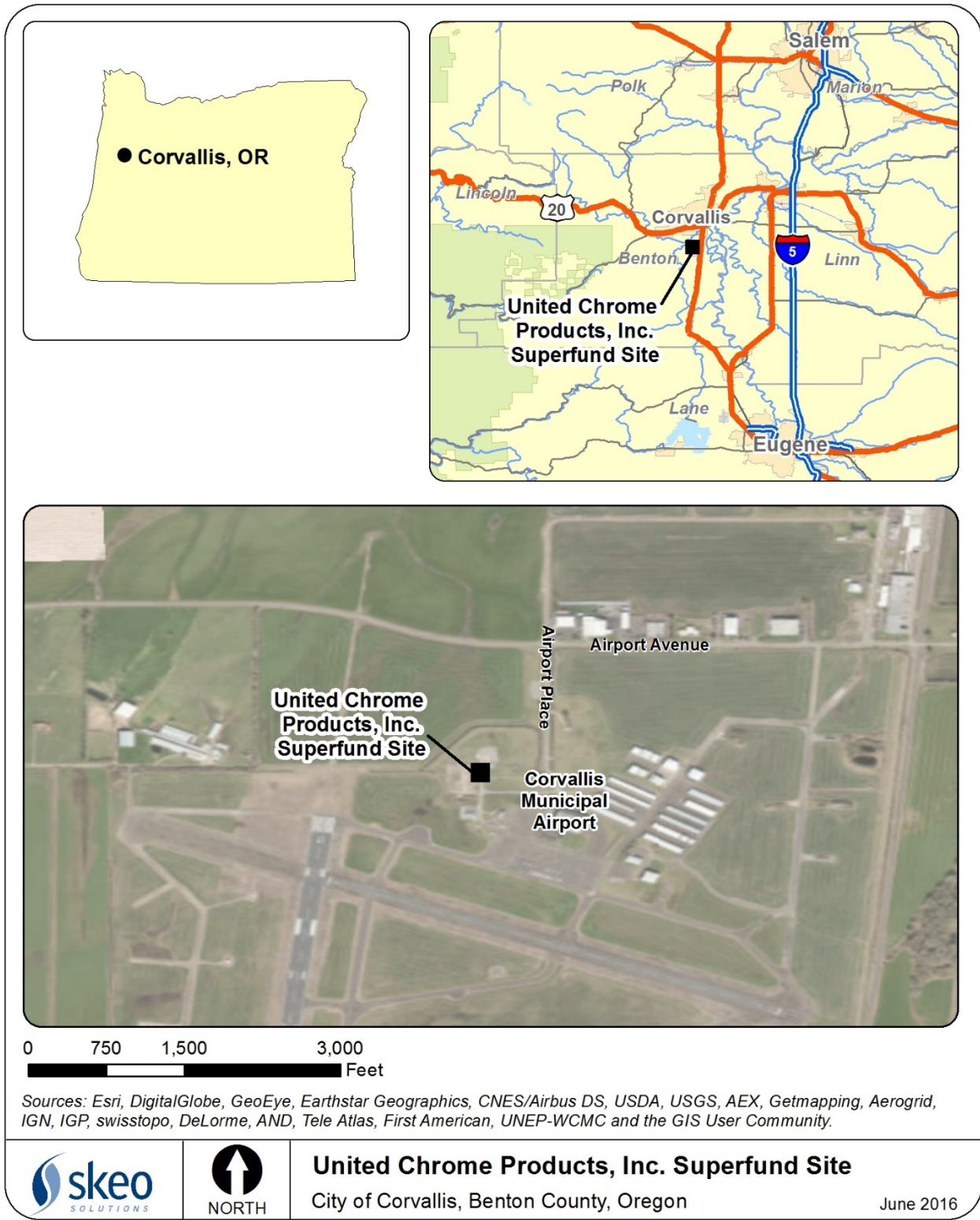
- An O&M Plan should be developed and implemented that requires continued monitoring of total and hexavalent chromium to ensure all MCL exceedances are captured and site inspections to ensure appropriate site use.

## **VIII. NEXT REVIEW**

The remedy for this site was originally selected prior to passage of the Superfund Amendments and Reauthorization Act (pre-SARA) and the remedy does not allow for unlimited use and unrestricted exposure, and thus this is a policy FYR. The next FYR Report for the United Chrome Products, Inc. Superfund site will be completed five years from the completion date of this review.

# APPENDIX A – VICINITY MAP

Figure A-1: Site Vicinity Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

## **APPENDIX B – REFERENCE LIST**

Deed Restriction, United Chrome Products, Inc. Superfund Site, City of Corvallis Public Works, Corvallis, Oregon. April 1993.

Easement and Equitable Servitudes, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. September 2011.

Explanation of Significant Differences, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. EPA Region 10. December 1991.

Explanation of Significant Differences, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. EPA Region 10. August 2010.

Feasibility Study Report, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. EPA Region 10. August 1985.

Fourth Five-Year Review, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. EPA Region 10. August 2011.

Interim Close-Out Report, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. EPA Region 10. December 1991.

Project Update Memorandum, United Chrome Products, Inc. Superfund Site, Geosyntec Consultants, Portland, Oregon. August 2014.

Project Update Memorandum, United Chrome Products, Inc. Superfund Site, Geosyntec Consultants, Portland, Oregon. September 2014.

Project Update Memorandum, United Chrome Products, Inc. Superfund Site, Geosyntec Consultants, Portland, Oregon. April 2015.

Project Update Memorandum, United Chrome Products, Inc. Superfund Site, Geosyntec Consultants, Portland, Oregon. September 2015.

Project Update Memorandum, United Chrome Products, Inc. Superfund Site, Geosyntec Consultants, Portland, Oregon. April 2016.

Record of Decision, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. EPA Region 10. September 1986.

Remedial Action Report for the Soil Operable Unit, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. EPA Region 10. February 2001.

Remedial Investigation Report, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. Ecology and Environment, Inc. July 1985.

Sampling and Analysis Plan for Easement and Equitable Servitude Boundary Verification, United Chrome Products, Inc. Superfund Site, CH2MHILL. April 2011.

Screening Human Health Risk Assessment for Chromium in Soils and Qualitative Assessment of Heavy Metals in Ditch Sediment, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. EPA Region 10. July 2002.

Soil Remedial Action Report, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. EPA Region 10. February 2001.

Targeted Soil Removal Remedial Action Completion Report, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. EPA Region 10. September 2011.

Third Five-Year Review, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. EPA Region 10. March 2003.

Well Abandonment – Phase V Field Work Report, United Chrome Products, Inc. Superfund Site, Corvallis, Oregon. City of Corvallis Public Works Department. August 2001.

## APPENDIX C – SITE CHRONOLOGY

**Table C-1: Site Chronology**

Event	Date
UCP began operations at the Site	1956
Use of dry well for wastes reportedly stopped	1975
Initial discovery of contamination	July 1, 1979
EPA conducted site inspection	June 27, 1983
EPA proposed Site for listing on Superfund program's NPL	September 8, 1983
EPA listed Site on NPL	September 21, 1984
EPA began Site's RI/FS	November 1984
UCP ceased operations	1985
EPA began emergency removal action to stabilize Site; 6,300 gallons of spent plating solution and 114 drums and containers removed	July 2, 1985
EPA completed emergency removal action	November 6, 1985
EPA signed Site's ROD and completed RI/FS	September 12, 1986
EPA initiated remedial design for groundwater	February 4, 1987
State support agency cooperative agreement began	September 8, 1987
EPA completed remedial design for groundwater	September 11, 1987
EPA initiated remedial action for groundwater	September 24, 1987
UCP building demolished	March 1988
EPA issued Administrative Order on Consent to City of Corvallis	June 29, 1988
Unilateral Administrative Order issued by EPA for operation of the upper zone groundwater treatment system	August 7, 1989
EPA signed Site's first ESD	December 20, 1991
EPA designated the Site "construction complete" and prepared Interim Close-Out Report	December 27, 1991
State support agency cooperative agreement completed	July 31, 1992
State support agency cooperative agreement began	August 1, 1992
EPA and City of Corvallis entered into Consent Decree	October 14, 1992
First FYR signed by EPA	November 30, 1992
EPA completed remedial action for groundwater	December 22, 1993
State support agency cooperative agreement completed	June 30, 1996
Second FYR signed by EPA	March 24, 1998
PRP-led remedial design initiated for site soils	May 31, 2000
PRP-led remedial design for site soils completed and remedial action initiated	September 11, 2000
PRP-led remedial action for soils completed	January 11, 2001
Screening human health risk assessment for chromium in soils and qualitative assessment of heavy metals in ditch sediment completed	July 1, 2002
Site's third FYR signed by EPA	March 31, 2003
EPA signed Site's second ESD	August 28, 2010
City initiated soil removal action	July 25, 2011
City completed soil removal action	September 26, 2011
Fourth FYR signed by EPA	September 29, 2011

## APPENDIX D – PRESS NOTICE

	<b>Site Inspection June 23, 2016 for United Chrome Superfund Site, Corvallis OR</b>
<p><b>We Want to Hear From You</b>  <i>As someone living close to the site we want to keep you informed. Also you may know of or have observed things that can help our review team. If you have information or concerns you would like us to consider during our review, please contact Eva DeMaria, EPA Project Manager, no later than August 1, 2016.</i></p> <p><b>Contact Information:</b>  <b>Eva DeMaria (206) 553-1970</b>  <a href="mailto:demaria.eva@epa.gov">demaria.eva@epa.gov</a></p> <p><b>More Information Is Available</b>  <i>Prior Five-Year Reviews, site information, and other documents are available.</i></p> <p><b>Online:</b> <a href="http://go.usa.gov/cSz4m">http://go.usa.gov/cSz4m</a></p> <p><b>And at these locations:</b>            Corvallis Public Library            545 NW Monroe Avenue            Corvallis OR 97330            541-766-6793  <a href="http://cbcpubliclibrary.net/locations-and-hours/corvallis/">http://cbcpubliclibrary.net/locations-and-hours/corvallis/</a></p> <p>EPA Region 10            Central Record Center            1200 Sixth Avenue, Suite 900            Seattle WA 98101            (206) 553-4494            1-800-424-4372 ext. 4494  <b>call ahead for an appointment</b></p>	<p>The U.S. Environmental Protection Agency will visit the United Chrome Products Superfund Site June 23, 2016. Cleanup measures, current site conditions and uses, and any community concerns will be evaluated as part of the site's fifth Five-Year Review. These routine assessments identify any current or ongoing issues and make sure the cleanup process continues to protect people and the environment.</p> <p><b>Site history</b>            Electroplating operations were ongoing from 1956 to 1985, contaminating shallow and deep groundwater, surface water, sediments and on-site soils with chromium. Cleanup actions began in 1987 and included:</p> <ul style="list-style-type: none"> <li>▪ groundwater extraction and treatment,</li> <li>▪ demolition of buildings and other hazardous materials,</li> <li>▪ removing contaminated soils to a hazardous waste facility,</li> <li>▪ re-routing a drainage ditch to prevent contaminated groundwater from entering nearby surface water ditches, and</li> <li>▪ long term controls to prevent use of contaminated water or exposure to contaminated soils.</li> </ul> <p><b>Current status</b>            Chromium contaminated groundwater is still reaching the deep aquifer in a limited area. However, the aquifer is not currently used as a source of drinking water and the contamination lies entirely under land owned by the airport. Groundwater treatment, extraction, and monitoring continues. Direct human contact to contaminated soils was addressed in a decision document. Additional controls have been added and recorded to limit site use until cleanup goals are fully met.</p> <p><b>Site description</b>            The 1.5 acre Site is located next to the Corvallis Municipal Airport about 3.5 miles south of Corvallis. Owned by the City of Corvallis, the Site is zoned as general industrial. A propane storage and distribution terminal is on the northeast part of the site. Other parts of the site are used for equipment storage. Future plans include a ground mounted solar array. The nearest homes are about three-fourths mile east along Highway 99 and well beyond the site boundary.</p> <p><b>TDD or TTY users may call the Federal Relay Service at 1-800-877-8339. Please give the operator Eva DeMaria's phone number (206) 553-1970.</b></p>

## APPENDIX E – INTERVIEW FORMS

### United Chrome Products, Inc. Superfund Site

### Five-Year Review Interview Form

Site Name: United Chrome Products, Inc.

EPA ID No.: ORD009043001

Interviewer Name: N/A

Affiliation: N/A

Subject Name: Norman Read

Affiliation: State

Subject Contact Information: 541-687-7348

Time: 14:25 p.m.

Date: 06/16/2016

Interview Location: N/A

Interview Format: Email

Interview Category: State Agency

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

The immediate risks from soil and groundwater appear to have been managed. Risks from groundwater could be addressed with institutional controls and ongoing operations and maintenance.

2. What is your assessment of the current performance of the remedy in place at the Site?

Based on the data we have so far, it appears that the selected remedy would have to be operated for a very long time to reach remedial goals.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?

No.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities.

Yes, I participated in the July 2011 effort to do a targeted soil removal (545 tons), and helped draft the current EES, which formalize soil and groundwater use restrictions. The EES also governs things like access restrictions and zoning changes.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy?

No, other than to say that Oregon state law allows verifiable use restrictions along with natural attenuation to be a valid site remedy for groundwater contamination.

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

I believe the current institutional controls at the Site are protective of human health and the environment.

7. Are you aware of any changes in projected land use(s) at the Site?

I believe that there have been some proposals for commercial surface use of the Site that would be in line with the restrictions in the EES.



8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

Not at this time.

**United Chrome Products, Inc.  
Superfund Site**

**Five-Year Review Interview Form**

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Site Name:	<u>United Chrome Products, Inc.</u>	EPA ID No.:	<u>ORD009043001</u>
Interviewer Name:	<u>Via Email</u>	Affiliation:	<u>N/A</u>
Subject Name:	<u>Joey Hickey</u>	Affiliation:	<u>Consultant</u>
Subject Contact Information:	<u>jhickey@geosyntec.com</u>		
Time:	<u>11:00 a.m.</u>	Date:	<u>06/24/16</u>
Interview Location:	<u>N/A</u>		

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**Interview Format : Email**

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**Interview Category: City of Corvallis Consultant**

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

The City of Corvallis is in the process of having a new solar array installed at the Site (reuse). The cleanup of the Site is done, with the exception of a limited areas where the point of compliance for groundwater is above the action level.

2. What is your assessment of the current performance of the remedy in place at the Site?

There is no risk associated with the site. The work done in the 1980s through the 2000s remediated the Site. There is a small area where groundwater exceeds the cleanup level and the current pumping system provides limited containment.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?

The biannual reports have been provided to EPA. Only DW-8 and DW-9 have shown hexavalent chromium concentrations above the action level since Geosyntec's involvement.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.

The City of Corvallis provides their own O&M for the Site. Geosyntec assisted with the purchase of a new controller and pump when needed.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

Geosyntec is unaware of any changes or impacts.

6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please provide details.

The pump in DW-9 had to be replaced, but this was not a difficult O&M issue.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

None.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

I do not have any additional comments about the O&M. It is our belief that the “shallow” aquifer (cleanup level of 10) and the “deeper” aquifer (cleanup level of 0.1) are connected. As such, the cleanup of the deeper aquifer to 0.1, via natural attenuation and limited pumping will take significant time. Transferring the Site to DEQ would allow for its closure under DEQ risk-based scenarios. It does not seem warranted or necessary to look to a large-scale treatment system to address a small groundwater plume that poses no risk to current or future receptors.

**United Chrome Products, Inc.  
Superfund Site**

**Five-Year Review Interview Form**

Site Name: United Chrome Products, Inc.  
Interviewer Name: N/A  
Subject Name: Lisa Scherf  
Subject Contact Information: 541-754-1759  
Time: N/A  
Interview Location: Corvallis, OR

EPA ID No.: ORD009043001  
Affiliation: N/A  
Affiliation: Owner – City of Corvallis  
Date: 09/13/2016

**Interview Format: Email**

**Interview Category: O&M**

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

The site has been stable for a long time. The treatment method has been effective in achieving the cleanup objectives. A reuse project is planned for this fall, with a ground-mounted solar array.

2. What is your assessment of the current performance of the remedy in place at the Site?

As noted in 1), the remedy has been effective in achieving the cleanup objectives.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?

The levels found in the monitoring data have been stable. The only time there were abnormal readings were when a pump wore out. Upon replacement, reading levels returned to the typical figures we see from the sampling well.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.

There is a half-time O&M position on site Monday – Friday. For issues that arise when this person is not on-site, his supervisor is available, as am I. After hours, the City has a rotating on-call supervisor who may be reached 24/7.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

No changes.

6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please provide details.

No. A pump (DW-9) was replaced, but that is a typical maintenance event.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

No changes.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

I understand from our consultant, Geosyntec, and the Oregon DEQ, that the site poses a very low risk and as such, would be eligible for closure if jurisdiction were transferred to the DEQ from EPA. I believe this would be positive course of action.

## APPENDIX F – MONITORING DATA

**Table F-1: Hexavalent Chromium in the Confined Lower Zone (2011 to 2016)**

Sampling Date	Hexavalent Chromium Concentration (mg/L)						
	DW-2	DW-8 (37 feet below ground surface)	DW-9 (38 feet below ground surface)	DW-10	DW-12	DW-13	DW-15
03/30/2011	0.01	<b>0.15</b>	<b>0.7</b>	<0.01	0.01	0.01	0.01
09/28/2011	0.01	<b>0.17</b>	<b>1.2</b>	<0.01	0.01	0.01	0.01
03/24/2012	<0.01	<b>0.21</b>	<b>1.3</b>	<0.01	<0.01	0.01	<0.01
09/20/2012	0.008	<b>0.19</b>	<b>0.43</b>	<0.006	<0.006	<0.006	0.01
03/29/2013	0.027	<b>0.234</b>	<b>0.46</b>	<0.006	0.012	<0.006	0.014
03/20/2014	--	--	--	0.019	<0.01	<0.01	<0.01
04/23/2014	<0.01	<b>8.0</b>	<b>0.82</b>	--	--	--	--
09/04/2014	0.0259	<b>0.222</b>	<b>2.71</b>	0.027	<0.01	<0.01	0.0251
03/26/2015	0.013	<b>0.268</b>	<b>1.98</b>	0.016	<0.01	<0.01	0.013
09/03/2015	0.0189	<b>0.195</b>	<b>1.64</b>	0.0348	<0.005	<0.005	0.005
03/22/2016	0.014	<b>0.289</b>	<b>1.56</b>	0.02	<0.005	<0.005	0.005
09/28/2016	0.018	<b>0.293</b>	<b>2.48</b>	0.021	<0.005	<0.005	<b>0.221</b>
<i>Notes:</i> Source: November 2016 United Chrome Project Update Memorandum <b>Bold</b> = exceedance of the 0.1 mg/L ROD cleanup goal -- = data not available < = below detection limit							

**Table F-2: Total Chromium Concentrations in the Confined Lower Zone (2014 to 2016)**

Sampling Date	Total Chromium Concentration (mg/L)						
	DW-2	DW-8 (37 ft bgs)	DW-9 (38 ft bgs)	DW-10	DW-12	DW-13	DW-15
03/20/2014	--	--	--	0.0234	0.0279	0.0039	0.028
04/23/2014	0.0072	<b>8.66</b>	<b>0.989</b>	--	--	--	--
09/04/2014	<b>0.315</b>	<b>0.237</b>	<b>4.61</b>	0.0471	0.0219	0.0074	<b>0.28</b>
03/26/2015	0.0926	<b>0.299</b>	<b>2.35</b>	0.0343	0.0065	0.004	0.0662
09/03/2015	<b>0.233</b>	<b>0.194</b>	<b>2.33</b>	0.0588	0.0159	0.0108	<b>0.312</b>
03/22/2016	0.0469	<b>0.289</b>	<b>1.9</b>	0.0257	0.00503	0.00394	<b>0.156</b>
09/28/2016	<b>0.353</b>	<b>0.344</b>	<b>2.88</b>	0.0241	<0.00100	0.0162	<b>0.638</b>
<i>Notes:</i> Source: November 2016 United Chrome Project Update Memorandum <b>Bold</b> = exceedance of the 0.1 mg/L ROD cleanup goal -- = data not available < = below detection limit							



Contact	_____	_____	_____	_____
	Name	Title	Date	Phone No.
Problems/suggestions <input type="checkbox"/> Report attached: _____				
4. <b>Other Interviews</b> (optional) <input type="checkbox"/> Report attached: _____				
<b>III. ON-SITE DOCUMENTS AND RECORDS VERIFIED</b> (check all that apply)				
1. <b>O&amp;M Documents</b>				
<input type="checkbox"/> O&M manual	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input type="checkbox"/> As-built drawings	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input type="checkbox"/> Maintenance logs	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks: <u>Currently, there is no O&amp;M Plan in place. The Consent Decree included a pumping plan, which was updated as recently as 2009.</u>				
2. <b>Site-Specific Health and Safety Plan</b>				
<input type="checkbox"/> Contingency plan/emergency response plan	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks: _____				
3. <b>O&amp;M and OSHA Training Records</b>				
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A		
Remarks: _____				
4. <b>Permits and Service Agreements</b>				
<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input type="checkbox"/> Effluent discharge	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input type="checkbox"/> Waste disposal, POTW	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input type="checkbox"/> Other permits: _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks: _____				
5. <b>Gas Generation Records</b>				
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A		
Remarks: _____				
6. <b>Settlement Monument Records</b>				
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A		
Remarks: _____				
7. <b>Groundwater Monitoring Records</b>				
<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A		
Remarks: _____				
8. <b>Leachate Extraction Records</b>				
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A		
Remarks: _____				
9. <b>Discharge Compliance Records</b>				
<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input type="checkbox"/> Water (effluent)	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks: _____				



10.	<b>Daily Access/Security Logs</b>	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A								
Remarks: <u>Weekly check of DW-8.</u>												
<b>IV. O&amp;M COSTS</b>												
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input type="checkbox"/> Federal facility in-house <input type="checkbox"/> _____	<input type="checkbox"/> Contractor for state <input checked="" type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal facility										
2.	<b>O&amp;M Cost Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place <input type="checkbox"/> Unavailable Original O&M cost estimate: _____ <input type="checkbox"/> Breakdown attached  <div style="text-align: center;">Total annual cost by year for review period if available</div> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">From: <u>FY 2011-2012</u></td> <td style="width: 33%;">To: <u>FY 2015-2016</u></td> <td style="width: 15%; text-align: center;"><u>\$41,821</u></td> <td style="width: 19%; text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> </table>				From: <u>FY 2011-2012</u>	To: <u>FY 2015-2016</u>	<u>\$41,821</u>	<input type="checkbox"/> Breakdown attached	Date	Date	Total cost	
From: <u>FY 2011-2012</u>	To: <u>FY 2015-2016</u>	<u>\$41,821</u>	<input type="checkbox"/> Breakdown attached									
Date	Date	Total cost										
3.	<b>Unanticipated or Unusually High O&amp;M Costs during Review Period</b> Describe costs and reasons: _____											
<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A												
<b>A. Fencing</b>												
1.	<b>Fencing Damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks: <u>Some briar growth on fenceline.</u>											
<b>B. Other Access Restrictions</b>												
1.	<b>Signs and Other Security Measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks: _____											
<b>C. Institutional Controls (ICs)</b>												

<b>1. Implementation and Enforcement</b> Site conditions imply ICs not properly implemented <span style="float: right;"><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A</span> Site conditions imply ICs not being fully enforced <span style="float: right;"><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A</span> Type of monitoring (e.g., self-reporting, drive by): _____ Frequency: _____ Responsible party/agency: <u>City of Corvallis</u> Contact <u>Lisa Scherf</u> <u>Transportation Services Supervisor</u> _____ <u>541-754-1759</u> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <span>Name</span> <span>Title</span> <span>Date</span> <span>Phone no.</span> </div> Reporting is up to date <span style="float: right;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A</span> Reports are verified by the lead agency <span style="float: right;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A</span> Specific requirements in deed or decision documents have been met <span style="float: right;"><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A</span> Violations have been reported <span style="float: right;"><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A</span> Other problems or suggestions: <input type="checkbox"/> Report attached			
<b>2. Adequacy</b> <input checked="" type="checkbox"/> ICs are adequate <span style="margin-left: 50px;"><input type="checkbox"/> ICs are inadequate</span> <span style="float: right;"><input type="checkbox"/> N/A</span> Remarks: _____			
<b>D. General</b>			
<b>1. Vandalism/Trespassing</b> <input type="checkbox"/> Location shown on site map <span style="margin-left: 20px;"><input checked="" type="checkbox"/> No vandalism evident</span> Remarks: _____			
<b>2. Land Use Changes On Site</b> <span style="float: right;"><input type="checkbox"/> N/A</span> Remarks: <u>City of Corvallis to install a solar array in 2016.</u>			
<b>3. Land Use Changes Off Site</b> <span style="float: right;"><input type="checkbox"/> N/A</span> Remarks: <u>Road alongside Site upgraded in June 2016.</u>			
<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>1. Roads Damaged</b> <input type="checkbox"/> Location shown on site map <span style="margin-left: 20px;"><input type="checkbox"/> Roads adequate</span> <span style="float: right;"><input type="checkbox"/> N/A</span> Remarks: _____			
<b>B. Other Site Conditions</b>			
Remarks: _____			
<b>VII. LANDFILL COVERS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
<b>A. Landfill Surface</b>			
<b>1. Settlement</b> (low spots) <input type="checkbox"/> Location shown on site map <span style="margin-left: 20px;"><input checked="" type="checkbox"/> Settlement not evident</span> Arial extent: _____ <span style="float: right;">Depth: _____</span> Remarks: _____			
<b>2. Cracks</b> <input type="checkbox"/> Location shown on site map <span style="margin-left: 20px;"><input checked="" type="checkbox"/> Cracking not evident</span> Lengths: _____ <span style="margin-left: 20px;">Widths: _____</span> <span style="float: right;">Depths: _____</span>			

Remarks: _____			
3.	<b>Erosion</b> Aerial extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident Depth: _____
4.	<b>Holes</b> Aerial extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Holes not evident Depth: _____
5.	<b>Vegetative Cover</b> <input type="checkbox"/> No signs of stress Remarks: _____	<input type="checkbox"/> Grass <input type="checkbox"/> Trees/shrubs (indicate size and locations on a diagram)	<input checked="" type="checkbox"/> Cover properly established
6.	<b>Alternative Cover</b> (e.g., armored rock, concrete)		<input type="checkbox"/> N/A
Remarks: <u>Majority of Site is covered by old concrete slabs and gravel. Some vegetation also remains.</u>			
7.	<b>Bulges</b> Aerial extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Bulges not evident Height: _____
8.	<b>Wet Areas/Water Damage</b>  <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks: _____	<input checked="" type="checkbox"/> Wet areas/water damage not evident  <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map	Aerial extent: _____ Aerial extent: _____ Aerial extent: _____ Aerial extent: _____
9.	<b>Slope Instability</b> <input checked="" type="checkbox"/> No evidence of slope instability Aerial extent: _____ Remarks: _____	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
<b>B. Benches</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b> Remarks: _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
2.	<b>Bench Breached</b> Remarks: _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
3.	<b>Bench Overtopped</b> Remarks: _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side			

slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b> (Low spots)	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Arial extent: _____		Depth: _____
	Remarks: _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type: _____		Arial extent: _____
	Remarks: _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	<b>Obstructions</b>	Type: _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Arial extent: _____	
	Size: _____		
	Remarks: _____		
6.	<b>Excessive Vegetative Growth</b>	Type: _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Arial extent: _____	
	Remarks: _____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> Good condition
			<input type="checkbox"/> N/A
	Remarks: _____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
	Remarks: _____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)		
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> Good condition
			<input type="checkbox"/> N/A
	Remarks: _____		
4.	<b>Extraction Wells Leachate</b>		

	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition		
	<input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A		
Remarks: _____			
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A	
Remarks: _____			
<b>E. Gas Collection and Treatment</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	<b>Gas Treatment Facilities</b>		
	<input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse		
	<input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance		
Remarks: _____			
2.	<b>Gas Collection Wells, Manifolds and Piping</b>		
	<input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance		
Remarks: _____			
3.	<b>Gas Monitoring Facilities</b> (e.g., gas monitoring of adjacent homes or buildings)		
	<input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A		
Remarks: _____			
<b>F. Cover Drainage Layer</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	<b>Outlet Pipes Inspected</b>	<input type="checkbox"/> Functioning <input type="checkbox"/> N/A	
Remarks: _____			
2.	<b>Outlet Rock Inspected</b>	<input type="checkbox"/> Functioning <input type="checkbox"/> N/A	
Remarks: _____			
<b>G. Detention/Sedimentation Ponds</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	<b>Siltation</b>	Area extent: _____ Depth: _____	<input type="checkbox"/> N/A
	<input type="checkbox"/> Siltation not evident		
Remarks: _____			
2.	<b>Erosion</b>	Area extent: _____ Depth: _____	
	<input type="checkbox"/> Erosion not evident		
Remarks: _____			
3.	<b>Outlet Works</b>	<input type="checkbox"/> Functioning <input type="checkbox"/> N/A	
Remarks: _____			
4.	<b>Dam</b>	<input type="checkbox"/> Functioning <input type="checkbox"/> N/A	
Remarks: _____			
<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident	
	Horizontal displacement: _____	Vertical displacement: _____	
	Rotational displacement: _____		

Remarks: _____			
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
Remarks: _____			
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
Area extent: _____		Depth: _____	
Remarks: _____			
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
<input type="checkbox"/> Vegetation does not impede flow			
Area extent: _____		Type: _____	
Remarks: _____			
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
Area extent: _____		Depth: _____	
Remarks: _____			
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
Area extent: _____		Depth: _____	
Remarks: _____			
2.	<b>Performance Monitoring</b>	Type of monitoring: _____	
<input type="checkbox"/> Performance not monitored			
Frequency: _____		<input type="checkbox"/> Evidence of breaching	
Head differential: _____			
Remarks: _____			
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps and Pipelines</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Pumps, Wellhead Plumbing and Electrical</b>		
<input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A			
Remarks: <u>DW-8 (recovery well) pump was replaced since the previous FYR.</u>			
2.	<b>Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances</b>		
<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance			
Remarks: _____			
3.	<b>Spare Parts and Equipment</b>		
<input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided			
Remarks: _____			

<b>B. Surface Water Collection Structures, Pumps and Pipelines</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	<b>Collection Structures, Pumps and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks: _____
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks: _____
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks: _____
<b>C. Treatment System</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	<b>Treatment Train</b> (check components that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div><input type="checkbox"/> Metals removal</div> <div><input type="checkbox"/> Oil/water separation</div> <div><input type="checkbox"/> Bioremediation</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div><input type="checkbox"/> Air stripping</div> <div><input type="checkbox"/> Carbon adsorbers</div> </div> <div style="margin-top: 5px;"><input type="checkbox"/> Filters: _____</div> <div style="margin-top: 5px;"><input type="checkbox"/> Additive (e.g., chelation agent, flocculent): _____</div> <div style="margin-top: 5px;"><input type="checkbox"/> Others: _____</div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div><input type="checkbox"/> Good condition</div> <div><input type="checkbox"/> Needs maintenance</div> </div> <div style="margin-top: 5px;"><input type="checkbox"/> Sampling ports properly marked and functional</div> <div style="margin-top: 5px;"><input type="checkbox"/> Sampling/maintenance log displayed and up to date</div> <div style="margin-top: 5px;"><input type="checkbox"/> Equipment properly identified</div> <div style="margin-top: 5px;"><input type="checkbox"/> Quantity of groundwater treated annually: _____</div> <div style="margin-top: 5px;"><input type="checkbox"/> Quantity of surface water treated annually: _____</div> <div style="margin-top: 10px;">           Remarks: <u>Groundwater is pumped directly to sewer, which eventually connects to the City of Corvallis' publicly owned treatment works.</u> </div>
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks: _____
3.	<b>Tanks, Vaults, Storage Vessels</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs maintenance Remarks: _____
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks: _____
5.	<b>Treatment Building(s)</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair

<input type="checkbox"/> Chemicals and equipment properly stored Remarks: _____	
6. <b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks: _____	
<b>D. Monitoring Data</b>	
1. <b>Monitoring Data</b> <input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality	
2. <b>Monitoring Data Suggests:</b> <input checked="" type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining	
<b>E. Monitored Natural Attenuation</b>	
1. <b>Monitoring Wells</b> (natural attenuation remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance <input checked="" type="checkbox"/> N/A Remarks: _____	
<b>X. OTHER REMEDIES</b>	
If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	
<b>XI. OVERALL OBSERVATIONS</b>	
<b>A. Implementation of the Remedy</b>	
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions). <u>The on-site groundwater treatment system was decommissioned in 1999. Since then, contaminated groundwater is hydraulically contained on site by pumping DW-8 and discharging the water to the municipal sewer system. Institutional controls are in place to restrict land use and well installation.</u>	
<b>B. Adequacy of O&amp;M</b>	
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. <u>There is currently no O&amp;M Plan in place. DW-8 is checked weekly. Wells are sampled twice a year.</u>	
<b>C. Early Indicators of Potential Remedy Problems</b>	
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. <u>The current remedy will not fully remediate the groundwater in the foreseeable future. Additional remedies should be considered.</u>	
<b>D. Opportunities for Optimization</b>	
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. _____	



## APPENDIX H – SITE INSPECTION PHOTOS



Fencing, signage and building near site entrance



Former concrete structures, slabs and vehicles on site



Former tank pads



Location where DW-8 pumps to sewer (next to tank pads above)





Graveled areas where previous soil excavations took place



Concrete pads and truck storage



Recovery well DW-8 opened for observation



DW-10





Fenceline between main facility and leased CoEnergy area, DW-2 is located at fourth fencepost from the right



Upgraded airport access road next to Site (on right)



Thirty-thousand-gallon liquefied natural gas tank on property leased by CoEnergy



Potential source of oil contamination in DW-12 (overflowing yellow bucket under trailer)





Tank storage on CoEnergy lot, DW-12 in foreground and trailer in background

## APPENDIX I – IRON SCREENING-LEVEL RISK EVALUATION

**Table I-1: Screening-Level Risk Evaluation of Iron in Sediment and Subsurface Soil**

Contaminant	Sediment (surface skim) (mg/kg)		Subsurface Soil (mg/kg)		2002 Residential Preliminary Remediation Goal (mg/kg)	2016 Non-carcinogenic Residential RSL <sup>a</sup>
	Minimum	Maximum	Minimum	Maximum		
Iron	21,467	43,026	35,000	<b>77,069</b>	23,000	55,000

*Notes:*  
a = Values are EPA's RSL for carcinogenic and non-carcinogenic effects available at <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016> (accessed 06/16/16). A carcinogenic residential RSL for iron was not available.  
Source: 2002 Screening Human Health Risk Assessment for Chromium in Soils and Qualitative Assessment of Heavy Metals in Ditch Sediment.  
*Italicized* = exceeds 2002 standard  
**Bold** = exceeds 2016 non-carcinogenic residential RSL  
Mg/kg = milligrams per kilogram



## APPENDIX J – 2000 SOIL EXCAVATION AREAS

